

REMARKS

The present invention relates to an engine startup fuel control system for use with an internal combustion engine having a plurality of combustion chambers and a multipoint fuel injector associated with each combustion chamber. A cold start fuel injector also provides fuel to the engine through a cold start fuel passageway while a processing circuit selectively activates both the multipoint fuel injectors as well as the cold start fuel injectors during engine startup.

More specifically, the processing unit determines the air/fuel mixture introduced by the cold start fuel injector into each combustion chamber during engine startup and then selectively activates the multipoint fuel injectors to achieve a predetermined air/fuel mixture in each combustion chamber during engine startup.

The operation of Applicant's invention is perhaps most easily described with reference to FIG. 4 of the patent drawing and the patent specification beginning on page 13, line 6. As is clearly described in this portion of the patent specification, during engine startup, the ECU determines the relative position of the combustion chambers for the internal combustion engine as a function of the angular position of the main shaft for the engine. Thereafter, the multipoint fuel injectors are selectively activated during the intake cycle to achieve the target air/fuel mixture ratio, when combined with the air/fuel mixture from the cold start fuel injector, for the engine. In doing so, the processing circuit or ECU compensates for the transport delay of the air/fuel charge from the cold start fuel injector to the various combustion chambers for the engine; see patent specification, page 15, line 14 – page 16, line 6.

All of the claims in the instant application have been carefully drafted in order to clearly define that the multipoint fuel injectors are selectively activated so that the fuel charge from the multipoint fuel injectors, when combined with the fuel charge from the cold start fuel injector,

achieve the desired air/fuel ratio. Specifically, the last two paragraphs of independent claim 1 clearly define the processing means for determining the air/fuel mixture from the cold start fuel injector and then the selective activation of the multipoint fuel injectors to achieve the predetermined air/fuel mixture during engine startup.

Similarly, the second independent claim 8, last paragraph, clearly defines the processing means for selectively activating the multipoint fuel injectors during engine startup to compensate for the transport delay of the fuel charge from the cold start fuel injector.

Similarly, the third independent claim, claim 14, clearly defines the step of calculating the air/fuel charge from the cold start fuel injector as a function of the angular position of the main shaft in the third paragraph of claim 14. Claim 14 then clearly defines the step of selectively activating the multipoint fuel injectors to achieve the predetermined fuel charge from the cold start fuel injector and multipoint fuel injectors for each combustion chamber.

Independent claim 19 differs from the other independent claims in that it clearly defines the means for selectively activating the spark igniters associated with each combustion chamber as well as selectively retarding the activation of the spark igniters during engine startup in an amount different than the other spark igniters.

Claim 21, the last independent claim, also differs from the other independent claims and clearly defines the means for activating the cold start fuel injector as a series of pulses to produce a fuel charge for each combustion cycle of each combustion chamber. These few pulses are illustrated in FIG. 6 of the patent drawing and described in the patent specification on page 18 beginning at line 22.

The Patent Examiner, however, has rejected all of the independent claims in this application as anticipated under 35 U.S.C. §102(b) by U.S. Patent No. 5,894,832 to Nogi et al.

Applicant, however, respectfully submits that this basis for rejection is in error and should be withdrawn.

More specifically, the Nogi et al. patent discloses a cold start engine control system having a cold start fuel injector 1 (see FIG. 2) which injects fuel into the cold start fuel passageway during engine startup. As is best described in column 8, lines 17-28 of Nogi et al., the cold start fuel injector provides all of the fuel to the engine during engine startup and then switches over to the multipoint fuel injectors once engine startup has been achieved; see also step 24 in FIG. 8.

Consequently, in Nogi et al. the cold start fuel injector and multipoint fuel injectors operate in a mutually exclusive fashion except during the transition period after the engine has warmed up. This is conventional for cold start fuel injector systems, i.e. the cold start fuel injector provides all of the fuel to the engine during engine startup until a warm engine condition is achieved after which the multipoint fuel injectors take over the fuel delivery for the engine and the cold start fuel injector is deactivated.

This is exactly the opposite of Applicant's invention. In Applicant's invention as is clearly defined in the claims, the multipoint fuel injectors and cold start fuel injector are simultaneously selectively activated during engine startup in order to achieve the target air/fuel ratio for each combustion chamber of the engine. In short, Nogi et al. teaches away from, not towards, Applicant's invention.

More specifically, with respect to claim 1 of the instant application, there is absolutely no teaching or suggestion in Nogi et al. of the processing means for determining the air/fuel mixture determined by the cold start fuel injector and then selectively activating the multipoint fuel

injectors to achieve a predetermined air/fuel mixture during engine startup. This is clearly defined in claim 1 and is lacking from Nogi et al.

Likewise, there is absolutely no suggestion or teaching in the Nogi et al. patent of the processing means for selectively activating the multipoint fuel injectors during engine startup to compensate for the transport delay of the fuel charge from the cold start fuel injector as is clearly defined in claim 8. Indeed, Nogi et al. teaches exactly the opposite, i.e. that the cold start fuel injector provides the fuel charge to the engine until engine warm up is achieved and then transitions immediately to the multipoint fuel injectors.

Similarly, there is absolutely no teaching or suggestion in Nogi et al. of calculating the fuel charge provided by the cold start fuel injector to each combustion chamber as a function of the angular position of the main shaft as is clearly defined in claim 14. Likewise, there is absolutely no suggestion in the Nogi et al. patent of selectively activating the multipoint fuel injectors in response to that calculation to achieve a predetermined combined fuel charge from the cold start fuel injector and multipoint fuel injectors as is clearly set forth in claim 14.

Likewise, there is absolutely no suggestion, whatsoever, in the Nogi et al. patent of varying the retardation of the spark igniters for the combustion engine in amounts which differ from the other spark igniters. This, however, is clearly defined in claim 19.

Likewise, with respect to claim 21, there is absolutely no teaching or suggestion in the Nogi et al. patent of activating the cold start fuel injector with a plurality of pulses for each combustion cycle of each engine as is clearly defined in claim 21.

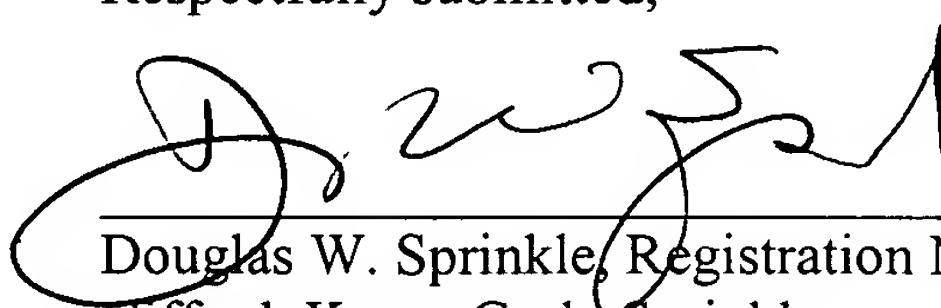
In conclusion, the Nogi et al. patent simply does not teach or even suggest Applicant's invention as it is clearly defined in the claims in this application. Instead, Nogi et al. teaches exactly the opposite, namely that the cold start fuel injector and multipoint fuel injectors operate

in a mutually exclusive fashion except, of course, during the transition from the cold start fuel injector to the multipoint fuel injectors after the engine has warmed up. Since the Nogi et al. patent does not contain the claimed elements of Applicant's invention, Applicant respectfully submits that the Patent Examiner's rejection of the independent claims in this case under 35 U.S.C. §102 is improper and should be withdrawn. Furthermore, since the Nogi et al. patent teaches away from, not towards, Applicant's invention, Applicant's invention, as it is defined in the independent claims in this application, clearly would not be obvious in view of the Nogi et al. patent. Rather, to modify the Nogi et al. patent to achieve Applicant's invention as it is claimed would be contrary to the clear teachings of Nogi et al. and, as such, cannot be obvious within the purview of 35 U.S.C. §103.

In view of the foregoing, Applicant respectfully submits that all of the independent claims in this application patentably define Applicant's invention over the Nogi et al. patent and are, therefore, allowable. All remaining claims in this application depend from one of the independent claims and are, therefore, also allowable.

In view of the foregoing, Applicant respectfully submits that this case is in condition for formal allowance and such action is respectfully solicited.

Respectfully submitted,



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